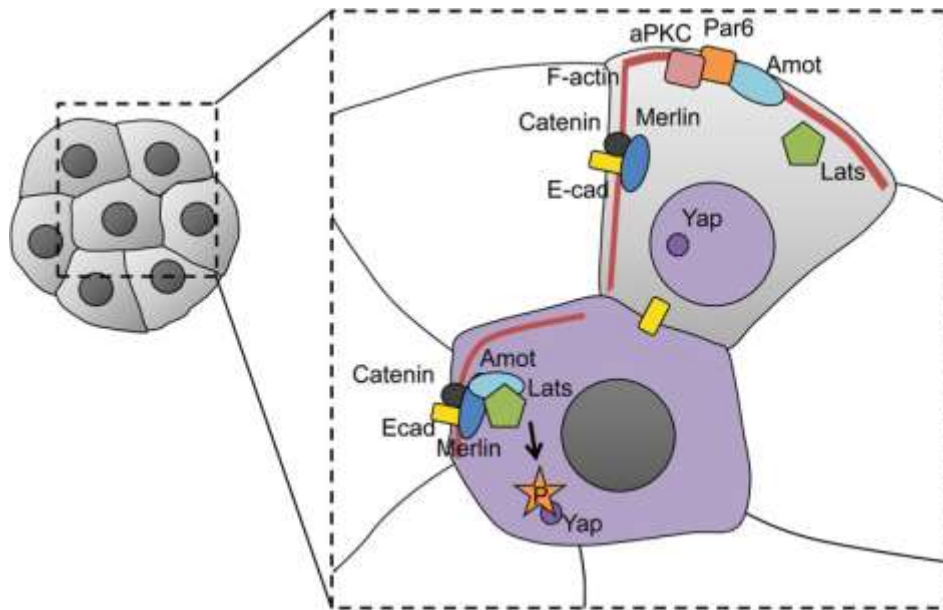


AP Biology – Unit 2.3 Quiz

1. Acidity in human urine is an example of
  - A. cell-mediated immune responses.
  - B. adaptive immunity.
  - C. acquired immunity.
  - D. innate immunity.
  
2. The cell-mediated immunity that destroys infected cells most involves
  - A. cytotoxic T cells.
  - B. natural killer cells.
  - C. helper T cells.
  - D. B cells.
  
3. Arrange these components of the mammalian immune system as it first responds to a pathogen in the correct sequence.
  - I. Pathogen is destroyed.
  - II. B cells secrete antibodies.
  - III. Antigens engulfed by antigen-presenting cell
  - IV. Helper T cells activated.
  - V. Only memory cells remain.
  - A. I → III → II → IV → V
  - B. III → II → I → V → IV
  - C. II → I → IV → III → V
  - D. III → IV → II → I → V
  
4. A species of wildflower is a long day plant, requiring a critical amount of darkness to trigger flowering. An experiment was designed in a lab so that during its normal period of darkness, a flash of light interrupted the darkness period at varying times over the course of the plant's normal flowering timeframe. Which of the following questions is appropriate concerning why the plant still flowered?
  - A. Was the temperature cold enough to prevent flowering?
  - B. Were there enough studies that supported the same results?
  - C. Was the wavelength of light an accurate representation of that received in its normal habitat?
  - D. Was the amount of water provided too little that it triggered flowering under stress?



The figure above shows the regulation of the “Hippo” pathway in a 16-cell stage mouse embryo. In outer cells, due to a lack of interaction between E-cad, Merlin, Amot and Lats, Yap remains unphosphorylated and can access the nucleus, where it promotes Cdx2 transcription. In inner cells, interaction between E-cad, Merlin and Amot activates Lats, leading to Yap phosphorylation and its retention in the cytoplasm.

5. Which of the following is most responsible for the differential expression among these cells?

- A. The differences in cell sizes.
- B. The natural variations in the nuclear DNA due to the combining of 2 parents’ DNA during fertilization.
- C. The differences in Lats concentration among the cells.
- D. The asymmetric distribution of cytoplasmic determinants during cell divisions.

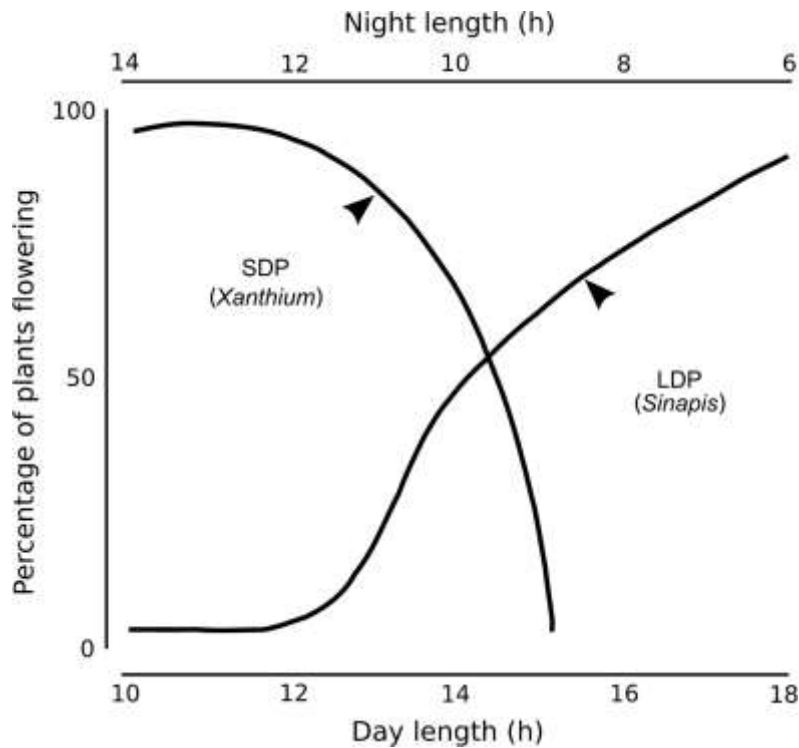
In a species of termite, some members serve as guards for the colony that can produce a highly corrosive & boiling liquid that can be fired in a single shot at an intruder. In some instances, the guards will produce the liquid in high volumes within their body until it causes them to explode, spewing the liquid onto large numbers of intruders.

6. Which of the following procedures would best determine if the guard termite’s natural ability to judge which type of action to take is an innate or a learned behavior?

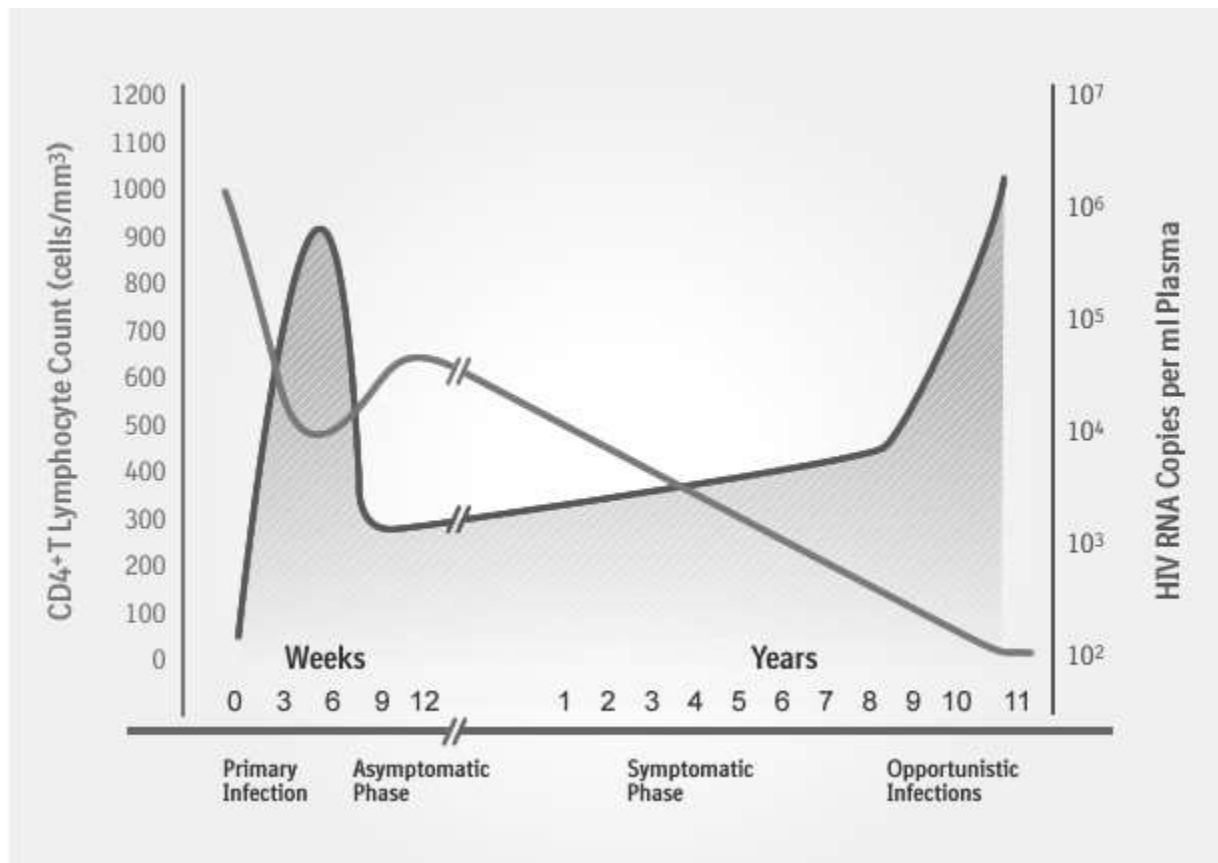
- A. Observe colonies that have all termites of exactly the same age.
- B. Expose the guards to a single attack type from birth and then after many months observe their encounters with the other attack type.
- C. Genetically engineer half the guards to have only 1 attack strategy and the other half with the other attack strategy; observe the 2 groups behaviors.
- D. Genetically engineer the guards so that their “explosive” attack becomes nonfunctional; observe their behavior.

## Calculations

7. Flowering is attributed to the light/dark cycles in the environment that plant populations have evolved in. The graph below shows a Short Day Plant species (SDP) and a Long Day Plant species (LDP). What percentage of the light/dark cycle must the LDP receive light in order to achieve about 75% flowering?



8. The graph below illustrates cellular trends occurring after infection with the HIV Virus, which severely disrupts homeostasis by depleting specific immune cells leading to decreased ability to fight even minor infections. The **left** Y-axis corresponds to the single line and the **right** Y-axis corresponds to the line with shading underneath. Between years 1 and 5, calculate the rate of change for the CD4-T Lymphocyte Count. Show your answer to the nearest **whole number**.



## Free Response

**Abscissic Acid (ABA)** is released in response to drought in plants. ABA causes stomata to close to prevent further water loss until normal water balance is restored.

**Auxin** is released in response to sunlight in plants. Auxin causes the cells opposite the light to elongate rapidly, causing a bending effect in the stem. More elongated cells produce more auxin, stimulating a continuous elongation of cells until completed.

**ADH** is released in response to low blood volume/dehydration. ADH dilates kidney tubules allowing water to be reabsorbed faster, increasing blood volume until a set point.

**Ethylene** is released by ripening fruit. Increasingly ripened fruit triggers more ethylene production until the ripening process is complete.

**LH** causes an egg to develop in a follicle and the follicle stimulates more LH production until the egg ruptures through the follicle during ovulation.

The list above shows some common molecules that function in feedback pathways.

9.

- Identify TWO chemicals above that participate in a negative feedback pathway.
- Identify TWO chemicals above that participate in a positive feedback pathway.
- Propose a model that links a disruption in a feedback pathway (not necessarily in the list above) with cancer.

# Answer Sheet

\_\_\_\_\_ 1.      \_\_\_\_\_ 2.      \_\_\_\_\_ 3.      \_\_\_\_\_ 4.      \_\_\_\_\_ 5.      \_\_\_\_\_ 6.

+ / - \_\_\_\_\_ 7. (circle whether positive or negative if a non-zero answer)

+ / - \_\_\_\_\_ 8. (circle whether positive or negative if a non-zero answer)

9.

a. \_\_\_\_\_

\_\_\_\_\_

b. \_\_\_\_\_

\_\_\_\_\_

**C.**

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.